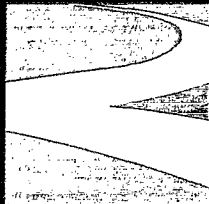


PHASE I PROGRESS REPORT



CALFED BAY-DELTA PROGRAM

PHASE I PROGRESS REPORT

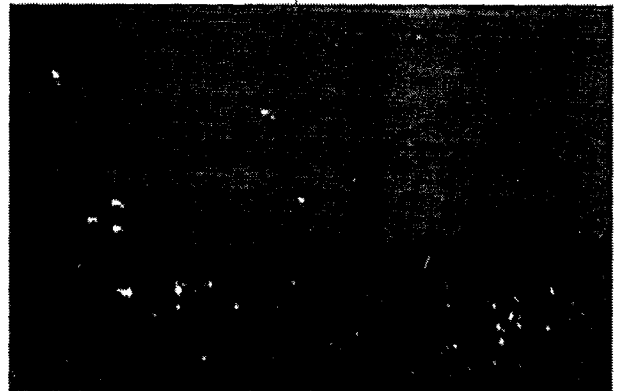


CALFED BAY-DELTA PROGRAM

The CALFED Bay-Delta Program is a joint effort among state and federal agencies with management and regulatory responsibilities in the Bay-Delta. The Program involves significant public and "stakeholder" involvement, and seeks resolution of Bay-Delta problems by building consensus rather than fostering conflict.

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PERSPECTIVE

This report summarizes Phase I of the CALFED Bay-Delta Program, a three-phase effort to develop a long-term solution to problems affecting the San Francisco Bay/Sacramento-San Joaquin Delta estuary (the Bay-Delta) in Northern California.

Four general categories of critical problems facing the Bay-Delta are defined—ecosystem quality, water quality, water supply reliability, and system vulnerability—along with 10 draft alternative solutions to these problems.

These draft alternatives represent combinations of actions that to varying degrees address each of the problems in the Bay-Delta's four critical areas. None are final products; all are subject to significant change based on further public input and technical analysis.

Moreover, these alternatives represent concepts, not project-level proposals. They focus on identifying a range of balanced actions that might be undertaken to address Bay-Delta problems—not when, where, and how specific actions should be taken to address these problems.

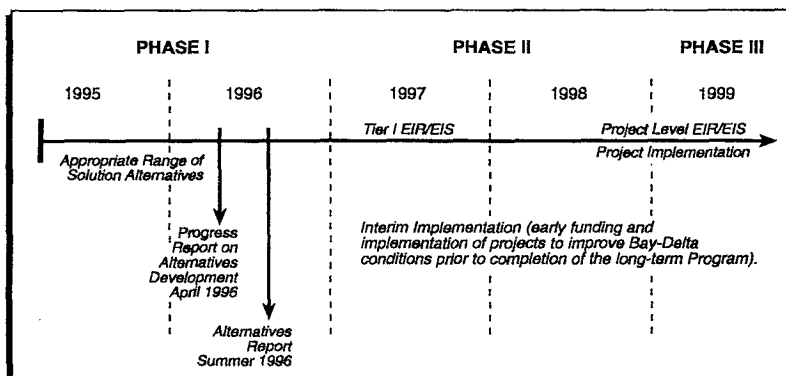
Both the problems and draft solutions have been identified in the Program's first phase, to be completed in late spring or summer of 1996. By the end of Phase I the 10 alternatives discussed here will have been refined to three to five. Phase II investigations will lead to identification of one preferred alternative. In Phase III, project-level environmental documents

will be prepared. Phase III will begin in mid-1998 and continue in a staged fashion over several years.

The CALFED Bay-Delta Program is a joint effort among state and federal agencies with management and regulatory responsibilities in the Bay-Delta. The Program involves significant public and "stakeholder" involvement, and seeks resolution of Bay-Delta problems by building consensus rather than fostering conflict.

The 10 alternatives described in this document continue to change and evolve on almost a daily basis in response to input from the Bay-Delta Advisory Council (BDAC) and CALFED agencies. As a result, the alternatives in this document differ somewhat from those to be presented at workshop 6 and Program scoping meetings in mid-April of this year.

The basic structure and components of the alternatives will remain the same, however, and any differences will be thoroughly explained and discussed at CALFED public events in April and beyond. Notably, the Program will not begin refining these 10 alternatives to reach the "short list" of three to five until after receiving full public input. The Program welcomes questions regarding this refinement process. Program staff may be reached by telephone at 916/657-2666.



CALFED Bay-Delta Program Progress Report, April 1996

PROGRAM OVERVIEW

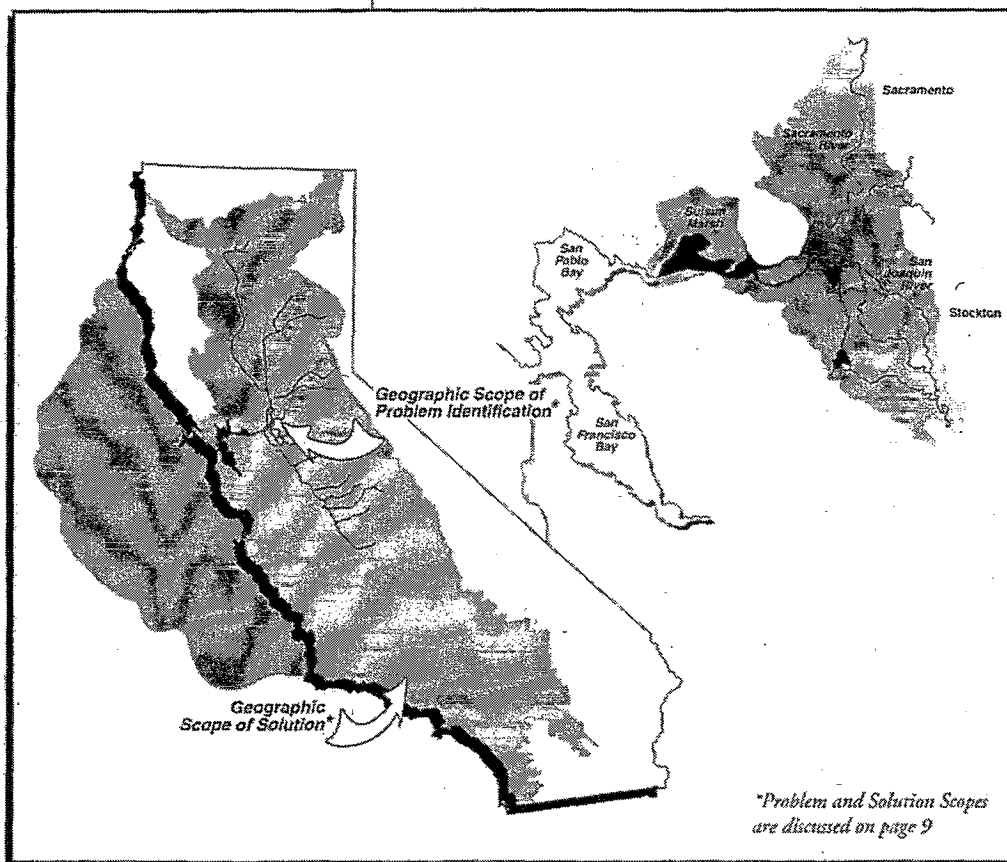
The Bay-Delta is the largest estuary on the West Coast, a beautiful, lush, and varied ecosystem including a maze of tributaries, sloughs, and islands encompassing approximately 700 square miles. Lying at the confluence of California's two largest rivers, the Sacramento and the San Joaquin, it is a haven for plants and wildlife, including 70,000 acres of wetlands and supporting 120 fish species.

In addition to its ecological importance, the Bay-Delta is critical to California's

and agricultural. And, it has suffered from this. Numerous efforts have been made to address Bay-Delta problems. But the issues are complex and interrelated, and many continue unresolved.

PROGRAM ORGANIZATION

The CALFED Bay-Delta Program has two fundamental organizational characteristics that distinguish it from other government programs.



First, it is a cooperative, interagency effort involving a number of state and federal agencies with management and regulatory responsibilities in the Bay-Delta. A Program Coordination Team (PCT) made up of individuals from each participating agency provides liaison between the Bay-Delta Program and policy and technical experts within these agencies. The PCT provides direction in Program design and activities, and acts to ensure that Program decisions and direction are consistent with the goals and objectives of the participating agencies.

Second, it is a collaborative effort with Bay-Delta "stakeholders"—urban and agricultural water users, fishing interests, environmental organizations, businesses, and others—who contribute to Program design and to the problem-solving/decision-

economy, supplying drinking water for two-thirds of Californians and irrigation water for 200 crops, including 45 percent of the nation's fruits and vegetables.

Given this importance, the area has for decades been the focus of competing interests—economic and ecological, urban

making process. Public participation and input have been essential throughout the process to date, and have come principally through the BDAC and public participation in workshops and meetings. The BDAC is chartered under the Federal Advisory Committee Act and includes representatives of stakeholder groups

ORGANIZATIONAL HISTORY AND STRUCTURE OF THE CALFED BAY-DELTA PROGRAM

The CALFED Bay-Delta Program was established in May 1995 and is one element of CALFED, a consortium of five state agencies and five federal agencies with management and regulatory responsibilities in the Bay-Delta.

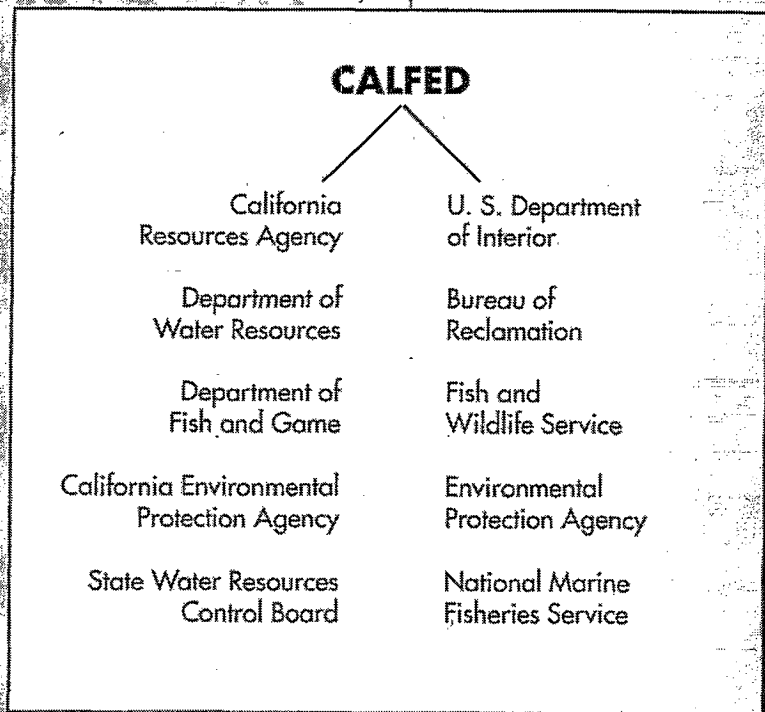
At the state level, these agencies include the California Resources Agency, Department of Water Resources, Department of Fish and Game, California Environmental Protection Agency, and State Water Resources Control Board. At the federal level, participating agencies include the U.S. Department of Interior, Bureau of Reclamation, Fish and Wildlife Service, Environmental Protection Agency, and National Marine Fisheries Service. The U.S. Army Corps of Engineers also participates as a cooperating agency.

CALFED provides policy direction to the Program. It was formed as part of a Framework Agreement signed in June 1994 by California Governor Pete Wilson and by Bruce Babbitt, Secretary of the U.S. Department of the Interior. As part of this Framework Agreement, the state and federal governments pledged to work together to formulate water quality standards to protect the Bay-Delta, coordinate State Water Project (SWP) and Central Valley Project (CVP) operations in the Bay-Delta, and develop a long-term Bay-Delta solution.

In December 1994, an agreement—the Bay-Delta Accord—was signed by state and federal regulatory agencies, with the cooperation of diverse interest groups, to address these issues. This accord set out integrated water quality standards and created a state/federal coordination group to better integrate the SWP and CVP. The Bay-Delta Program is charged with responsibility for the third issue: development of a long-term Bay-Delta solution.

Impetus to forge this long-term solution came at the state level in California in December 1992 with formation of the Water Policy Council and the Bay Delta Oversight Council, an advisory group to the Water Council. The following year, in September 1993, the Federal Ecosystem Directorate was created at the federal level to coordinate federal resource protection and management decisions for the Bay-Delta.

The Program is a collaborative effort with Bay-Delta "stakeholders" who contribute to Program design and the problem-solving/decision-making process.



Phase I will identify a short list of three to five alternative solutions to Bay-Delta problems.

appointed by the administration of California Governor Pete Wilson and by Bruce Babbitt, Secretary of the U.S. Department of the Interior.

The Program is managed by CALFED staff, with assistance from consulting organizations and is structured in three phases. Phase I began in May 1995 and is the subject of this report.

Phase II is a programmatic environmental review, reconnaissance-level analysis, and pre-feasibility-level planning effort to identify one preferred solution alternative.

Programmatic environmental reviews focus on broad policy and resource allocation decisions required to implement a program and are designed to inform decision makers about the interrelated and cumulative consequences of the alternatives. Reconnaissance-level analysis and pre-feasibility-level planning focus on further refinement of alternatives. Foundational work for Phase II began in January 1996. However, the majority of this effort will begin in June 1996 and conclude in June 1998.

Phase III will include site-specific environmental review of individual components of the preferred alternative selected at the conclusion of Phase II. Implementation of elements of this alternative could begin by July 1998 and will continue in a staged fashion over several years.

Other efforts are under way outside the CALFED Bay-Delta Program to address some of the problems and solutions being explored by the Program, particularly in upstream areas. Opportunities to aid or draw from these separate efforts have been and will continue to be assessed.

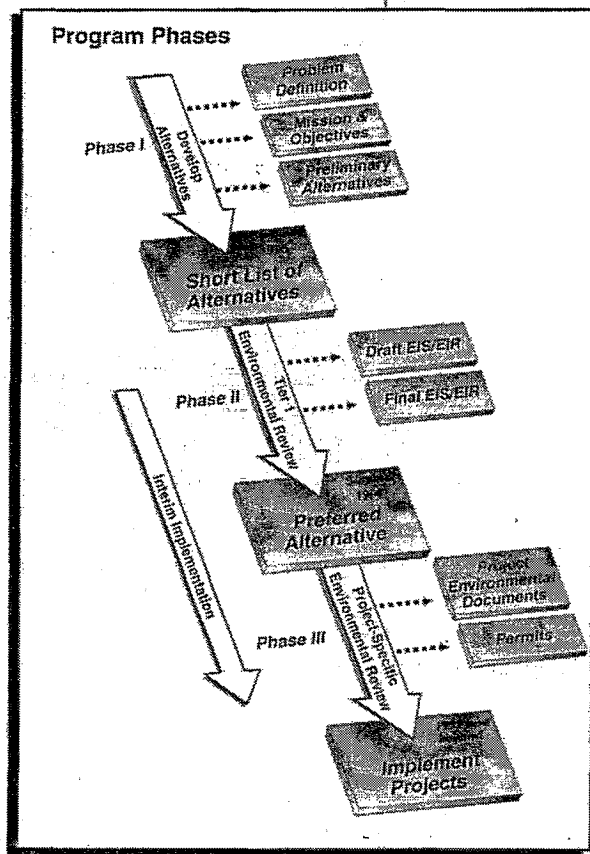
PHASE I GOAL AND OBJECTIVES

Phase I will identify a short list of three to five alternative solutions to Bay-Delta problems that will undergo assessment in Phase II of the Program. The 10 alternatives presented and discussed in this report represent an interim step in this refinement process.

Initial focus in Phase I was to define Bay-Delta problems and Program objectives, and to identify actions that could be taken to resolve these problems and meet these objectives. In addition, strategies were developed to identify, assemble, and refine the alternatives.

A six-step process was used to accomplish these goals, and Program workshops were convened or are planned to gather public comment at each step. Workshop 1 was held in August 1995 and focused on problem identification; workshop 2 was held in September 1995 and focused on defining Program objectives; workshop 3 was held in October 1995 to identify actions to resolve problems and meet objectives; workshop 4 focused on developing solution strategies and was held in December 1995; and workshop 5 was held in February 1996 to assess initial draft alternatives. Workshop 6, scheduled for April 1996, will focus on refining the 10 alternatives described in this report.

Bay-Delta problems and Program objectives defined in this manner are shown in the adjacent table. Objectives shown on the table are subobjectives. Primary Program objectives are to provide good water quality for all beneficial uses; to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species; to reduce the mismatch between Bay-Delta



BAY-DELTA PROBLEM AREAS & PROGRAM OBJECTIVES

ECOSYSTEM QUALITY

Problems

- Important aquatic habitats are inadequate to support production and survival of native and other desirable estuarine and anadromous fish in the Bay-Delta system. Examples of fishes that have experienced declines related to changes in Delta habitat include delta smelt, longfin smelt, Sacramento splittail, chinook salmon, striped bass, and American shad.

Objectives

- Improve and increase aquatic habitats so they can support the sustainable production and survival of native and other desirable estuarine and anadromous fish in the estuary.
- Increase population health and population size of Delta species to levels that assure sustained survival.

WATER QUALITY

Problems

- Water quality is often inadequate or is perceived as inadequate for drinking water needs.
- Delta water quality is often inadequate for agricultural needs.
- Delta water quality is often inadequate for industrial needs.
- Delta water quality is often inadequate for recreational needs.
- Water quality is often inadequate for environmental needs for the Bay-Delta system.

Objectives

- Provide good water quality in Delta water exported for drinking water needs.
- Provide good Delta water quality for agricultural use.
- Provide good Delta water quality for industrial use.
- Provide good Delta water quality for recreational use within the Delta.
- Provide improved Delta water quality for environmental needs.

WATER SUPPLY RELIABILITY

Problems

- Water supplies of the Bay-Delta system do not meet needs because of conflict among beneficial uses and because of system inadequacies.
- Bay-Delta system water supplies are uncertain with respect to short- and long-term needs.

Objectives

- Reduce the conflict between beneficial uses and improve the ability to transport water through the Bay-Delta system.
- Reduce the uncertainty of Bay-Delta system water supplies to help meet short- and long-term needs.

BAY-DELTA SYSTEM VULNERABILITY

Problems

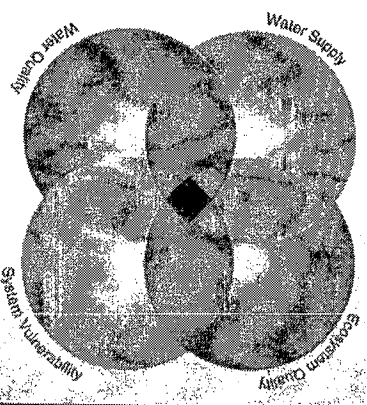
- Existing agricultural land use, economic activities, and infrastructure in the Delta are at risk from gradual deterioration of delta conveyance and flood control facilities as well as sudden catastrophic inundation of Delta islands.

Objectives

- Manage the risk to existing land use, associated economic activities, and infrastructure from gradual deterioration of Delta conveyance and flood control facilities and catastrophic inundation of Delta islands.
- Manage the risk to water supply facilities and operations in the Delta from catastrophic inundation of Delta islands.
- Manage the risk to water quality in the Delta from catastrophic inundation of Delta islands.
- Manage the risk to the existing Delta ecosystem, from gradual deterioration of Delta conveyance and flood control facilities and catastrophic inundation of Delta islands.

PROBLEM AND OBJECTIVE LINKAGES

Bay-Delta problem areas and program objectives are interrelated, and the solution must address all problems simultaneously.



Another focus in early Program development was definition of a set of six "solution principles."

Solutions will sustain the resources they were designed to protect and enhance.

water supplies and current and projected beneficial uses dependent on the Bay-Delta system; and to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees.

The Program's mission statement reads:

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

Another focus in early Program development was definition of a set of six "solution principles"—fundamental guides for evaluating alternative solutions. They are:

- *Reduce Conflicts in the System* Solutions will reduce major conflicts among beneficial uses of water.
- *Be Equitable* Solutions will focus on solving problems in all problem areas. Improvements for some problems will not be made without corresponding improvements for other problems.
- *Be Affordable* Solutions will be implementable and maintainable within the foreseeable resources of the Program and stakeholders.
- *Be Durable* Solutions will have political and economic staying power and will sustain the resources they were designed to protect and enhance.
- *Be Implementable* Solutions will have broad public acceptance and legal feasibility, and will be timely and relatively simple to implement compared with other alternatives.
- *Have No Significant Redirected Impacts* Solutions will not solve problems in the Bay-Delta system by

redirecting significant negative impacts, when viewed in their entirety, within the Bay-Delta or to other regions of California.

ACTIONS TO RESOLVE BAY-DELTA PROBLEMS

Fifty categories of potential actions to resolve Bay-Delta problems and achieve Program objectives were identified by reviewing existing literature and soliciting input from PCT and BDAC members, stakeholders, and the general public. Within these categories, hundreds of individual actions were defined.

From among this list, "core actions" were identified—actions that Program participants felt should be included as part of all program alternatives. Core actions generally enjoy broad support among stakeholders; provide a benefit to the entire Bay-Delta system; are cost effective; meet one or more Program objective(s); and provide some progress toward a solution but do not represent a satisfactory solution by themselves.

Moreover, core actions do not preclude or conflict with other actions; do not increase conflicts between beneficial users or stakeholders; do not represent a major program activity or major facility structure; and do not create significant adverse, site-specific impacts or redistribute costs.

Establishing an appropriate geographic scope within which to identify Bay-Delta problems and develop solution alternatives was an important aspect of this action identification process. To address this concern, separate problem and solution scopes were defined.

CATEGORIES OF ACTIONS THAT COULD BE TAKEN TO RESOLVE BAY-DELTA PROBLEMS AND MEET PROGRAM OBJECTIVES

Action Categories to Restore Bay-Delta System Habitats

- Restoration of Bay-Delta System Shallow Water (Tidal) Habitat
- Restoration of Bay-Delta System Riverine Habitat
- Restoration of Bay-Delta System Riparian Habitat
- Restoration of Bay-Delta System Wetland Habitat
- Restoration of Bay-Delta System Terrestrial Habitat
- Implementation of Integrated Habitat Management Programs
- Establishment of Floodways and Meander Belts
- Control of Introduced Species
- Delta Waterfowl Habitat Management

Action Categories to Restore Upstream Habitat

- Restoration of Upstream Anadromous Fish Habitat
- Improvements for Upstream Fish Passage
- Restoration of Upstream Riparian Habitat
- Restoration of Upstream Wetland Habitat

Action Categories to Reduce Effects of Diversions

- Delta Inflow/Outflow/Export Management
- Modification of Diversion Timing Patterns
- Increased Rates of Diversion Capacity
- Acquisition of Long-Term Water Supplies for Fish and Wildlife
- Installation and Improvement of Fish Screens
- Improvement of Bay-Delta System Fish Migration
- Improvement of Fish Salvage Operations
- Removal and Control of Aquatic Predators

Action Categories to Manage the Enhancement of Anadromous Fish Populations

- Fish Hatchery Operations
- Fish Harvest Management

Action Categories for Reducing Reliance on Delta Exports

- Desalination
- Water Conservation
- Water Reclamation
- Land Retirement and Fallowing
- Water Pricing

Action Categories to Enhance Water Supplies

- Watershed Management
- New or Expanded Onstream Storage
- New or Expanded Offstream Storage
- Groundwater Banking and Conjunctive Use
- Improvement of Through-Delta Conveyance
- Construction and Improvement of Conveyance Facilities
- Changes in Locations of Diversions

Action Categories to Increase Supply Predictability

- Water Transfers
- Long-Term Planning for Drought Contingencies
- Water Resources Data and Information Management
- Establishment of Institution for Integrated Long-Term Water Management
- Establishment of Export Capacity Market
- Integration of Land Use and Water Supply Planning

Action Categories for Managing Water Quality

- Installation and Operation of Flow Barriers
- Management of Agricultural Drainage
- Management of Urban/Industrial Drainage and Wastewater Discharge
- Dredged Material Management
- Management of Abandoned-Mine Drainage

Action Categories for Improving System Reliability

- Levee Maintenance and Stabilization
- Improvement of Flood Protection Levels and Seismic Stabilities
- Rerouting and Protection of Infrastructure from Flooding and Seismic Risks
- Establishment of Long-Term Funding Mechanisms

CORE ACTIONS TO BE INCLUDED IN ALL SOLUTION ALTERNATIVES

Bay-Delta Habitat Restoration

- Protect and Enhance Existing Shallow-Water Habitat
- Protect and Enhance Existing Riverine Habitat on Channel Islands
- Include Riverine Elements at Channel Edges by Modifying Levee Protection Practices
- Protect and Enhance Existing Riparian Habitat
- Increase Riparian Habitat
- Improve Riparian Habitat by Modifying Levee Maintenance Practices
- Improve Degraded Riparian Habitats
- Protect and Enhance Existing Wetlands
- Expand Wetland Acquisition Programs
- Protect and Enhance Existing Upland Habitat
- Encourage Wildlife-Friendly Agricultural Practices
- Preserve Agricultural Land Uses Providing Habitat
- Improve Regulations Regarding Ballast-Water Releases
- Improve Border Inspection Practices
- Establish a Rapid Response Program for Introduced Species

Upstream Habitat Restoration

- Improve Flows and Temperatures in Upstream Habitats
- Maintain Adequate Spawning Substrates
- Encourage Gravel-Mining Practices That Protect Fish Habitat
- Modify Fish Passage at Upstream Dams or Through Other Barriers
- Modify Natural Barriers to Improve Fish Passage
- Encourage Appropriate Livestock Management in Riparian Habitats
- Revegetate Degraded Riparian Habitats
- Encourage Wildlife-Friendly Agricultural Practices
- Preserve Agricultural Land Uses Providing Habitat
- Establish Additional Riparian Habitat

Reductions in the Effects of Diversions

- Use Real-Time Monitoring and Adaptive Management
- Install Screens on Unscreened In-Delta Diversions
- Install or Upgrade Screens on Upstream Diversions
- Evaluate and Implement Effective Acoustic Barriers to Anadromous Fish Movement
- Operate Fish Barrier on San Joaquin River at Merced River In Fall

Management of Anadromous Fish

- Modify Hatchery Operations to Reduce Effects on Wild Populations
- Improve Data Collection and Analysis Needed to Regulate Commercial Take

Reductions in Export Reliance

- Establish Incentives for Use of Agricultural Water Conservation Practices
- Increase Incentives for Use of Municipal and Industrial Conservation Practices
- Educate Small Agencies about Conservation and Reclamation Feasibility

Water Supply Enhancement

- Establish Incentives for Conjunctive Use
- Ease Institutional Barriers to Encourage Conjunctive Use

Increasing Water Supply Predictability

- Ease Institutional Obstacles to Facilitate Water Transfers
- Improve Procedures for Water Transfer Permitting
- Coordinate Diversion and Conveyance of Water Transfers
- Establish a Water Transfer Brokering Mechanism or Institution
- Manage Water Resources Data and Information for the Bay-Delta System
- Encourage Long-Term Drought Contingency Planning

Management of Water Quality

- Establish Incentives for Retirement of Lands with Drainage Problems
- Provide Incentives for Pollution Source Control on Agricultural Lands
- Encourage Management of Riparian Zones to Protect Water Quality
- Encourage Management of Land Uses to Protect Water Quality

Improvements to System Reliability

- Monitor, Evaluate, Maintain, and Stabilize Existing Levees
- Modify Agricultural Practices to Reduce Subsidence
- Investigate Techniques for Beneficial Reuse of Dredged Materials
- Establish an Emergency Levee Management Plan
- Provide Funding for Maintenance and Stabilization

- **Problem Scope** The Program addresses problems that exist within the legally defined Delta (i.e., Suisun Bay, extending to Carquinez Strait, and Suisun Marsh) or are closely linked to this area. Examples would include toxic inflows and outflows, in-migrating fish, and water diversion patterns.
- **Solution Scope** Because the Bay-Delta solution is part of a larger water and biological resource system, a much broader solution scope has been defined—one including at least the Central Valley watershed, the Southern California water system service area, and the portions of the Pacific Ocean out to the Farallone Islands. This is necessary because many problems related to the Bay-Delta are caused by factors outside the Bay-Delta. For example, salmon population problems are linked to the Bay-Delta due to high mortality rates during salmon migrations. While one solution would be to reduce mortality during salmon migration through the Bay-Delta, it might be less expensive or ecologically preferable to promote greater salmon production upstream. An expanded solution scope is also desirable from a planning perspective because more benefits may be generated at lower cost if solutions are not limited to the geographic Bay-Delta.

ALTERNATIVE IDENTIFICATION

Action categories represent the building blocks of solution alternatives—that is, each solution alternative is a combination of action categories reflecting differing approaches to achieving program objectives and addressing solution principles.

Given the large number of these categories, and the range of perspectives on solutions to Bay-Delta problems among stakeholders and CALFED agencies, thousands of potential alternatives could have been identified. In response to this, a first step for the Program was to devise a methodology that would keep the number of alternatives to a manageable level while still representing the full range of approaches to resolving the problems.

The methodology chosen to accomplish this was to define the critical conflicts that exist between beneficial uses and resources in the Bay Delta and then to define approaches to resolving these conflicts. The conflicts were

- **Fisheries versus Diversions** The conflict between fisheries and diversions results primarily from fish mortality attributable to water diversions. This includes direct loss at pumps, reduced survival when young fish are drawn out of river channels into the Delta, and reduced spawning success of adults when migratory cues are altered. The effects of diversions on species of special concern have resulted in regulations that restrict quantities and timing of diversions.
- **Habitat versus Land Use and Flood Protection** Habitat to support various life stages of aquatic and terrestrial biota in the Bay-Delta has been lost because of land development and construction of flood control facilities to protect developed land. The need for habitat affects land development planning as well as levee maintenance and planning. Efforts to restore the balance often require that land used for agricultural production be dedicated to habitat.
- **Water Supply Availability versus Beneficial Uses** As water use and competition for water have increased

Habitat to support various life stages of aquatic and terrestrial biota in the Bay-Delta has been lost.

As water use and competition for water have increased during the past several decades, conflict too has increased among users.

A systematic process was used to develop 96 preliminary solution alternatives which subsequently have served as the foundation for the refinement process.

during the past several decades, conflict too has increased among users. A major part of this conflict is between the volume of instream water needs and out-of-stream water needs, and the timing of those needs within the hydrologic cycle.

- **Water Quality versus Land Use** Water quality can be negatively impacted by land use, and ecosystem water quality needs are not always compatible with urban and agricultural water quality needs.

In assessing these conflicts, alternate approaches to conflict resolution, and alternative levels of resolution, were defined. Approaches for resolving the fisheries and diversions conflict included (1) a fish productivity approach and (2) a diversion modification approach. Approaches for resolving the habitat and land use/flood protection conflict included (1) an existing land-use pattern approach and (2) a modified land-use pattern approach.

Approaches for resolving the water supply availability and beneficial uses conflict included (1) a demand reduction approach and (2) a supply enhancement approach. Approaches for resolving the water quality and land-use conflict included (1) managing the quality of Delta inflows and (2) managing instream water quality after discharges had occurred.

Within each of these approaches, levels of conflict resolution ranging from less intensive to more intensive were identified.

This process produced 32 approaches to resolving the four conflicts. At this point, four teams of consultants representing a variety of technical disciplines were formed—one for each conflict area. These teams were then assigned an equal number of the 32 approaches (i.e., eight apiece), and directed to develop three preliminary

solution alternatives—sets of actions and action categories—for each of the eight approaches.

This procedure identified 96 preliminary solution alternatives (24 by each team) which have subsequently served as the foundation for the refinement process that will ultimately define the short list of three to five alternatives to go into Phase II analysis. In the Program's judgment, these 96 were representative of the larger number of possible combinations and sufficed to bracket the range of possible solutions to the four conflicts and, therefore, to the key problems facing the Bay-Delta.

ALTERNATIVE REFINEMENT

The 96 preliminary alternatives were very broad by design. Moreover, because they were crafted by teams representing the four conflict areas, they tended to address the four conflicts in varying degrees—that is, they were not balanced in addressing program objectives and solution principles.

In response, the teams were instructed to begin balancing their alternatives, and to refine the initial 24 per area to approximately 10 per area by combining those with similar characteristics. This produced a refined list of approximately 40 alternatives.

At this point in the process, leadership responsibility for the four teams was moved from the technical consultants to Program staff. This change was made to take advantage of staff's specific expertise on Bay-Delta issues and to more systematically include PCT members in the process so as to ensure maximum sensitivity to the policies and positions of their agencies and stakeholder groups.

Continued consolidation and balancing of the alternatives brought the number to 20 and these 20 were subsequently presented to stakeholders, BDAC members, and the public at workshop 5. Consolidation and refinement based on input from that workshop produced the 10 alternatives described in this report.

This process will continue in coming weeks to refine these 10 alternatives to the three to five most promising for Phase II evaluation. During this process, the relative characteristics of the alternatives will be assessed and displayed in terms of their attainment of Program objectives, cost performance, and satisfaction of solution principles. These displays will then be presented at workshops, at scoping meetings, and in discussions with the BDAC and PCT to solicit guidance and build support in crafting the preferred alternative.

In addition, the Program will at this point begin identifying strategies to stage or sequence implementation of the alternatives over time. Staging facilitates benefit assessment and financing and allows for "adaptive management" (i.e., the capability to adjust strategies and schedules based on benefits assessments, public input, and financing considerations) in guiding future implementation.

COST CONSIDERATIONS

At the time this report went to press, capital costs for the ten alternatives were estimated to range from \$4.1 billion to \$12.9 billion—an amount to be paid over 20 to 40 or more years.

Some of this cost will be absorbed by existing programs. For example, many core actions are already included and funded under existing programs such as the Central Valley Project Improvement Act. Furthermore, under the Program's

"affordability" solution principle, the solution alternative ultimately selected must be one that can be implemented and maintained using foreseeable resources. As a result, if analysis indicates that adequate funds cannot be anticipated to support a particular alternative, that alternative will be changed or discarded.

Because the Program has multiple objectives, the cost of the ultimate solution will support and be spread over many distinct and complex projects—possibly including hundreds of acres of new habitat, miles of rebuilt levees, and storage facilities ranging from 100,000 to millions of acre feet, for example. Each of these actions is a massive undertaking; even creation of new habitat carries a high price tag, requiring that tons of earth be moved and acres of landscape changed. In addition, just as these projects will be completed successively, the bill will come due in increments. Even the highest cost estimate seems less daunting when spread over a third or a half of a century.

Neither one sector of society nor one revenue source will shoulder responsibility for paying for the ultimate solution alternative. Rather, millions of entities—ranging potentially from government agencies to water users—will share the cost; and the funding strategy will include several revenue streams, possibly including federal grants, private-public partnerships, and general obligation bonds.

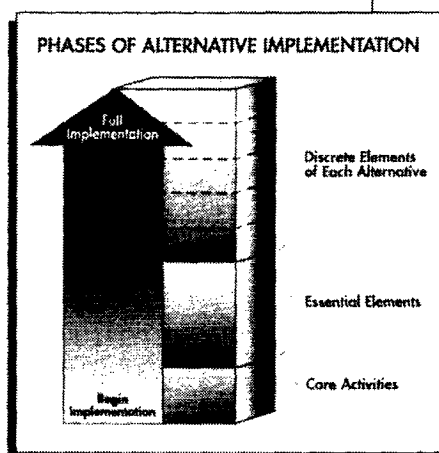
ALTERNATIVES OVERVIEW AND DESCRIPTIONS

The ten alternatives identified to date represent combinations of actions that to varying degrees address each of the problems identified in the Bay-Delta's four critical areas: ecosystem quality, water quality, water supply reliability, and system vulnerability.

In the table on the adjacent page listing key components of the alternatives, and in the alternative descriptions that follow on pages 14 to 23, actions are generally characterized at three levels of implementation: modest, moderate, and extensive. Modest actions remedy pressing problems at critical locations. Moderate actions resolve problems at critical and moderate priority locations or offer a moderate level of effort in meeting objectives. Extensive actions are implemented at a broad range of sites or involve the greatest level of effort in meeting objectives.

The "key components" table also groups alternatives by their emphasis: system reoperation, new facilities, or a combination of system reoperation and new facilities. An emphasis is not exclusive: a system reoperation alternative, for example, does not necessarily exclude new facilities.

Core actions are included as part of *each* alternative. As a result, these actions are not discussed in these summaries. (Page 8 lists core actions.) Additionally, all alternatives include "essential elements," actions that expand on core actions and are implemented soon after core actions. The term "essential elements" was suggested by participants at workshop 5 for a set of actions that was viewed by most to be essential to the success of any alternative. Essential elements should not be confused with core actions since they are not subject to the same criteria as core actions.



OVERVIEW OF ALTERNATIVES

Title	Focus
A. Extensive Demand Management	Divert less water from Delta
B. New Storage To Improve Delta Flow	Change timing of flows to benefit all uses
C. Dual Delta Conveyance	Provide diversified storage and conveyance
D. Through-Delta Conveyance	Modify timing of diversions
E. Delta Channel Habitat and Conveyance	Improve Delta channel habitat and conveyance
F. Extensive Habitat Restoration With Storage	Concentrate on extensive habitat restoration
G. East-Side Foothills Conveyance	Isolate conveyance and improve San Joaquin River flows
H. Chain of Lakes Conveyance	Isolate conveyance In-Delta
I. West-Side Conveyance and River Restoration	Isolate conveyance and remove diversions from the Sacramento River
J. East-Side Conveyance	Isolate conveyance around the Delta

Essential elements include restoration of modest amounts of habitat, modest levee improvements, a moderate program of demand management, establishment of a long-term drought water bank, groundwater banking, and extensive conjunctive use programs in the southern San Joaquin Valley. Other essential elements may be included as analysis proceeds and public input is received.

Because many alternatives call for new facilities and/or extensive changes in Bay-Delta operations, the CALFED Bay-Delta Program will identify strategies to stage implementation over time. Staging allows for adaptive management in guiding future implementation and offers greater flexibility in financing.

TWO KEY CONSIDERATIONS IN READING THE ALTERNATIVE DESCRIPTIONS

The Alternative Refinement Process Is Continuing

The 10 alternatives described in this document continue to change and evolve on almost a daily basis in response to input from the BDAC and CALFED agencies. As a result, the alternatives in this document differ somewhat from those to be presented at workshop 6 and Program scoping meetings in mid-April of this year.

The basic structure and components of the alternatives will remain the same, however, and any differences will be thoroughly explained and discussed at CALFED public events in April and beyond. Notably, the Program will not begin refining these 10 alternatives to reach the "short list" of three to five until after receiving full public input. The Program welcomes questions regarding this refinement process. Program staff may be reached by telephone at 916/657-2666.

All Alternatives Include Core Actions

Core actions are included as part of each alternative. As a result, these actions are not discussed in these summaries. (Page 8 lists core actions.)

KEY COMPONENTS OF THE ALTERNATIVES

Component	System Reoperation Alternatives			Reoperation and New Facilities Alternatives				New Facilities Alternatives		
	A	F	D	C	E	G	B	H	I	J
Reduce Demand	Extensive	Modest	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Channel Capacity Improvements	-	-	Extensive	Moderate	Extensive	-	-	-	-	-
Isolated Conveyance	-	-	-	Partial	-	Partial	-	Full	Full	Full
Surface Storage	In-Delta	In-Delta	In-Delta + Downstream	Upstream + Downstream	-	In-Delta	Upstream + Downstream	In-Delta	Upstream	-
Conjunctive Use/ Groundwater Banking	Extensive	Moderate	Moderate	Moderate	Moderate	Extensive	Moderate	Moderate	Moderate	Moderate
Water Quality	Modest	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive	Extensive	Moderate	Extensive
Bay & Delta Habitat Restoration	Modest	Extensive	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive
Upper Sacramento River Restoration	Modest	Extensive	Modest	Modest	Modest	Modest	Modest	Modest	Extensive	Extensive
System Vulnerability	Modest	Extensive	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive	Moderate	Extensive

ALTERNATIVE A

EXTENSIVE DEMAND MANAGEMENT

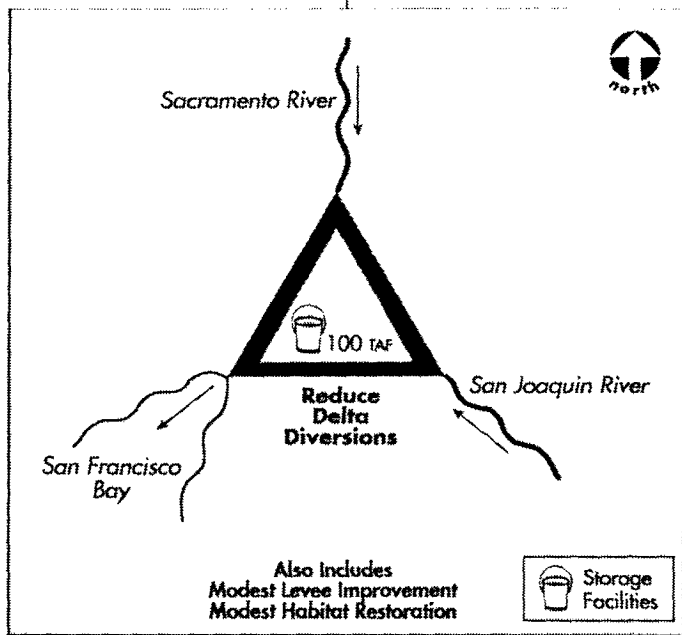
Substantial water savings will be achieved through aggressive demand management. Reducing demand for water and decreasing diversions will reduce effects of diversions on fish and wildlife and improve water supply flexibility and ecosystem quality.

This alternative will implement extensive water management programs to substantially reduce demand on the Bay-Delta system water supply. Demand will be eased through methods such as new water pricing structures, water conservation programs in urban and agricultural areas, urban water reclamation, and extensive retirement of agricultural land.

Land retirement also benefits water quality by targeting lands where irrigation results in drainage water containing substantial amounts of contaminants such as salts and selenium. Basic pollution source controls further improve water quality.

This alternative also calls for construction of water storage on Delta islands to help fish transport through the Delta and to be used for timed export diversions to reduce fish entrainment. Additional measures to protect fish will include screening on critical diversions; fish guidance improvements to keep fish away from Delta channels where they may face particularly high mortality; basic levels of restoration in critical areas of habitat in the Delta, along the Sacramento River and reconstructed levees, and near Suisun Bay; and modification of export forebay operations to reduce fish entrainment at the pumps.

Restoration of shallow water, riverine, and riparian habitats also will be completed as levees are rebuilt on Delta islands critical to system vulnerability and water quality, particularly in the western Delta where levee failure and flooding would draw salt into the Delta. These projects will include flood protection while enhancing ecosystem quality.



ALTERNATIVE B

NEW STORAGE TO IMPROVE DELTA FLOW

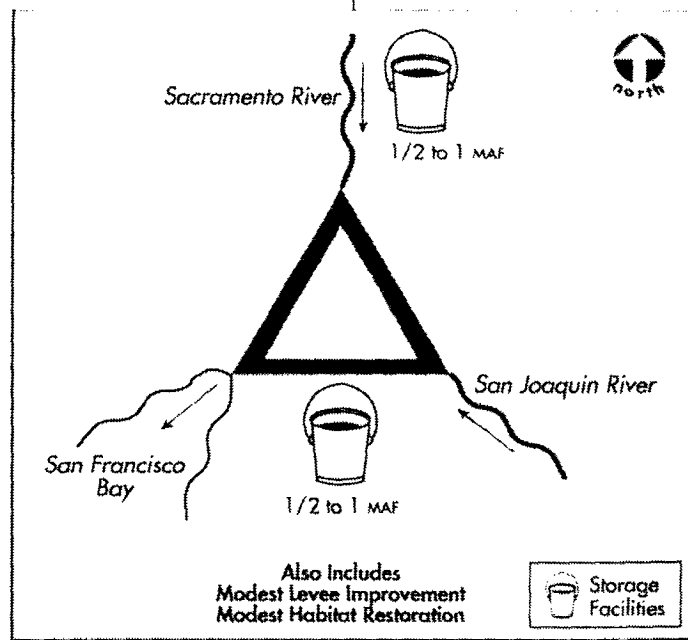
New water storage facilities upstream and downstream of the Delta will be constructed, system operation will be improved, and extensive pollution source control measures will be implemented. These actions will enhance water supply and water quality for the environment and for other water uses.

This alternative will divert water during high flows for storage in new facilities located north or upstream of the Delta and south or downstream in export areas. The new storage will allow flexibility in timing diversions during periods when small fish are least likely to be near pumps and in releasing additional water to help fish such as young salmon move downstream.

Other fish protection actions will include screening at critical and moderate priority sites, and installation of guidance devices to keep fish away from Delta channels where they may face particularly high mortality. This alternative will rely on the existing configuration of Delta channels for water conveyance.

Implementation of extensive pollution source control measures and moderate habitat restoration will be included, as well. Habitat restoration will focus on shallow water, riverine, and riparian habitats on the San Joaquin and Sacramento rivers, in the Delta, and near Suisun Bay. A moderate program of levee improvements throughout the Delta will be included both to improve habitat and reduce system vulnerability.

Other actions will include retirement of a moderate amount of agricultural land to improve water quality and moderate demand management to better balance supply and demand.



ALTERNATIVE C

DUAL DELTA CONVEYANCE

A new diversion facility will be constructed on the Sacramento River, through-Delta channels will be improved, and a small isolated conveyance facility will be constructed along the east side of the Delta from the diversion point to the export pumps. Additional water storage also will be built upstream of the Delta and downstream of the Delta in export areas. These projects will ensure that supply and quality objectives are met while fish entrainment is reduced.

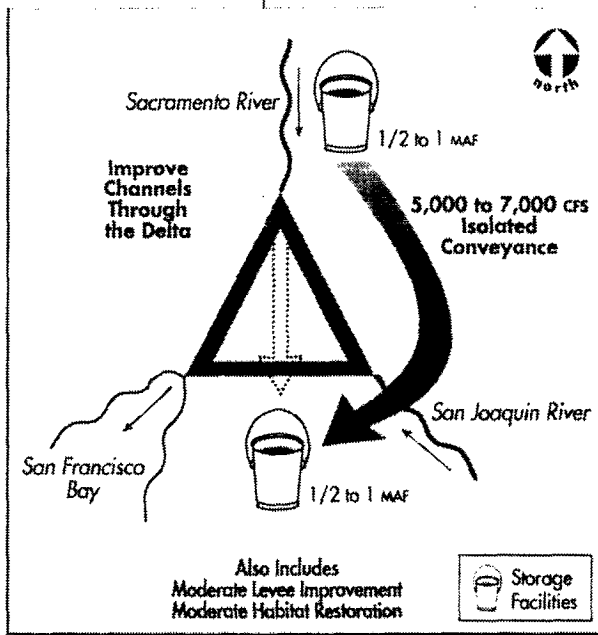
This alternative calls for construction of a new screened diversion facility on the Sacramento River to supply water for continued through-Delta conveyance and to supply a new small isolated conveyance facility to the east of the Bay-Delta to transport water to South Delta pumps. Water from the small east-side conveyance will supply most export needs during critical spring periods, and potentially supply some users in Sacramento and San

Joaquin counties, and the Bay Area. The east-side conveyance will include siphons under all important stream courses to prevent disruption of water quality and degradation of aquatic habitat. When diversion needs exceed the capacity of the isolated conveyance, the additional water will flow in the improved through-Delta channels to the export facilities.

New water storage is planned, both upstream and downstream of the Delta, to enhance water supply reliability and aid fish transport. These facilities will be used in concert with moderate demand management and reoperation of upstream reservoirs to allow flexibility in the system. This in turn will allow a shift in water diversions away from vulnerable periods for fish without interrupting water supply.

A new canal that is isolated from Delta channels will allow conveyance of water to South Delta pumps while reducing entrainment. The screened intake to the improved channels will keep fish from straying into channels where they are more vulnerable to predation. In addition, the isolated canal will eliminate reverse flow in the South Delta, a phenomenon that occurs when export pumps draw so much water from the Delta that salty downstream water flows up the river to the pumps. Instituting pollution source control measures, timing pollutant discharges, and retiring marginally productive agricultural acreage also will improve water quality.

Moderate levels of ecosystem restoration will take place in the Delta, along the Sacramento and San Joaquin rivers, and near Suisun Bay. These will be made in conjunction with moderate flood control and levee improvements. In addition, the new screened diversion point for through-Delta conveyance, and fish guidance improvements in other places, will increase fish survival.



ALTERNATIVE D

THROUGH-DELTA CONVEYANCE

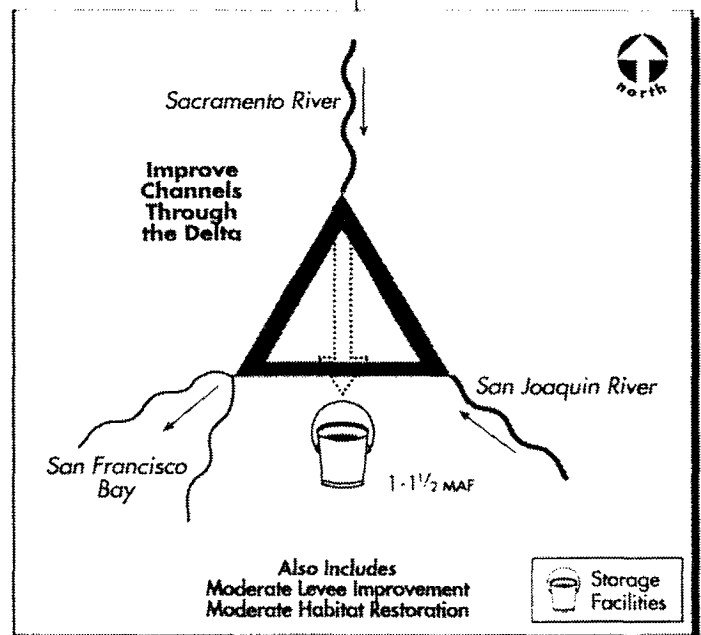
Construction of a screened diversion facility and new downstream water storage facilities will improve through-Delta conveyance. These facilities, and implementation of moderate programs to improve water quality, will enhance water supply reliability, water quality, and ecosystem quality.

This alternative will provide for a new screened diversion facility on the Sacramento River to supply water for continued through-Delta conveyance to existing South Delta pumps. Additionally, new surface storage will be constructed downstream in export areas for greater operational flexibility and water supply reliability. This storage will allow water diversions to be reduced during critical periods when many small fish are in the system. A smaller environmental reservoir located either in the South or Northwest Delta could be used to release water to keep more fish downstream away from diversion points.

Moderate levels of fish screening will be installed on diversions throughout the Delta and on upstream rivers and tributaries. Fish guidance will be improved to keep fish away from Delta channels where they may face particularly high mortality.

Further enhancement to ecosystem and water quality will result from critical pollutant source control measures, moderate land retirement, and moderate habitat restoration along the Sacramento and San Joaquin rivers and near Suisun Bay. Moderate levee and flood control improvements will be conducted in conjunction with habitat restoration to improve ecosystem quality.

Additional actions will include moderate demand management for urban and agricultural users.



ALTERNATIVE E

DELTA CHANNEL HABITAT AND CONVEYANCE

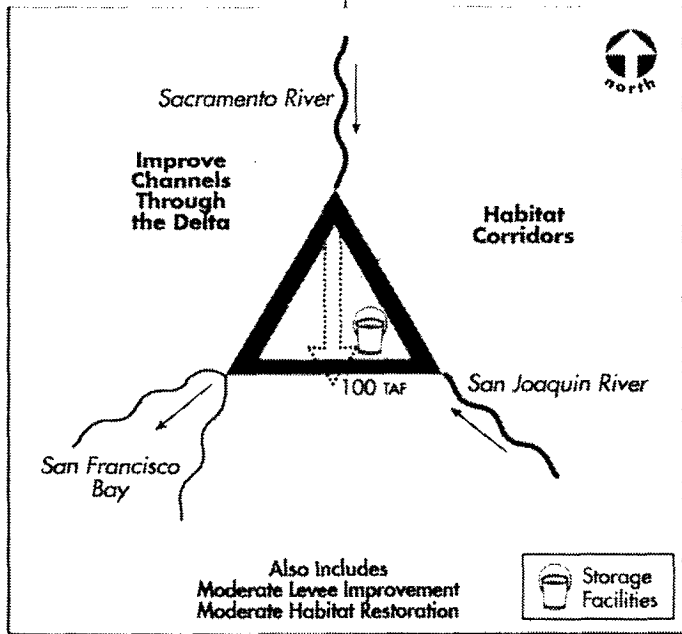
Delta habitat corridors and water conveyance through the Delta will be improved by broadening select channels and setting back select levees. Increasing the size of the channels will greatly reduce water velocity across the Delta toward export pumps, resulting in entrainment of fewer fish. Habitat corridors to improve fish and wildlife conditions in the Delta also will be provided.

This alternative will include construction of an unscreened diversion facility on the Sacramento River to supply water for continued through-Delta conveyance. Extensive channel modifications and a series of setback levees will help reduce the velocity of water flow to protect fish populations.

Channel modifications and setback levees will incorporate restoration of broad habitat corridors to further protect fish and wildlife and enhance ecosystem quality in the Bay-Delta.

If standard setbacks are inadequate to achieve ecosystem quality objectives, some islands in Delta and South Delta channels may be converted to tidally influenced habitat. New channel islands will be created to provide additional habitat and wave protection for several existing Delta islands.

To provide additional protection to fish and help ensure water supply reliability, timed diversions will be shifted from critical spring periods. Other actions will include fish screening at critical and moderate priority diversions, pollution source control, and moderate demand management.



ALTERNATIVE F

EXTENSIVE HABITAT RESTORATION WITH STORAGE

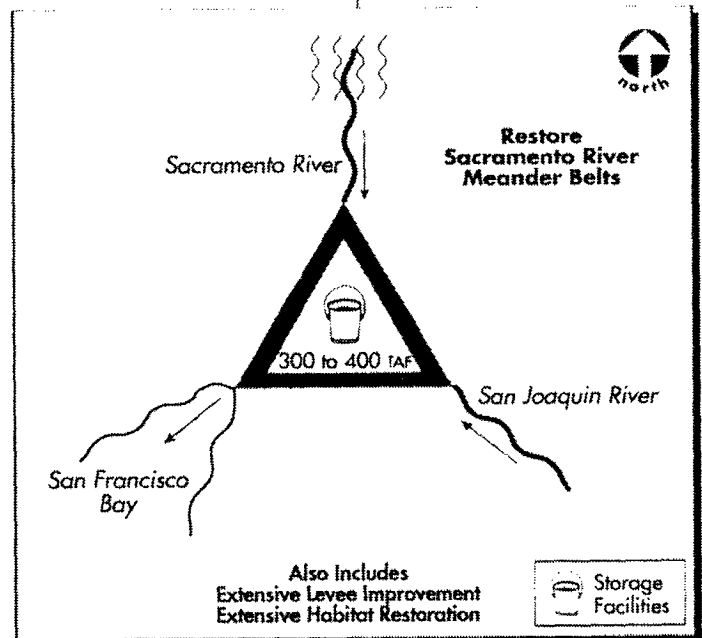
Extensive restoration of habitat will be provided throughout the Bay-Delta and upstream to improve ecosystem health and increase fish and wildlife populations. Stable, healthier aquatic populations should be less vulnerable to the impacts of water diversions and changes in the timing of flows. In addition to benefiting fish, this will provide greater water supply reliability.

This alternative will restore upstream habitat and establish extensive meander belts along the Sacramento River. In addition, channel features in the San Joaquin River will be restored to reduce water temperatures, provide improved habitat, and further encourage fish survival. In the Delta, shallow riverine and riparian habitat will be restored, and new habitat will be constructed along channels and levees. A number of these improvements will be completed in

conjunction with extensive levee and flood channel upgrades. To further reduce fish mortality, many water diversion facilities throughout the Bay-Delta and upstream will be fitted with fish screens. Additionally, extensive amounts of shallow tidal habitat will be developed in Suisun Bay.

A new storage facility in the South Delta filled through screened diversions when water is available will reserve water for fish transport. Real-time fish monitoring will be conducted so storage can be accomplished at times least likely to impact fish. Stored water will be released to aid fish transport and to shift the timing of diversions to avoid entrainment.

Pollution source control and better timing of discharges also will be implemented to achieve ecosystem and water quality objectives. Other actions will include moderate demand management and retirement of marginally productive agricultural land that contributes substantially to water quality problems.



ALTERNATIVE G

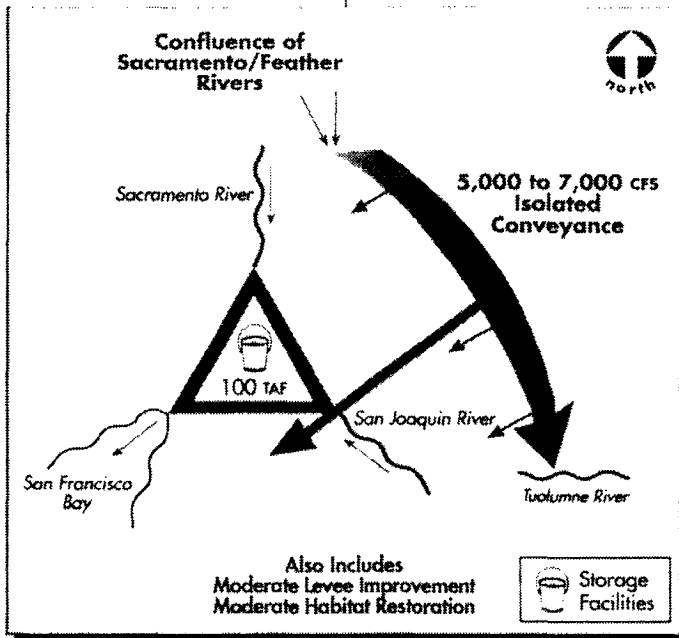
EAST-SIDE FOOTHILLS CONVEYANCE

An upstream diversion and conveyance facility will be constructed to carry water to export facilities and to water users along the east side of the San Joaquin Valley. New in-Delta storage also will be built to overcome problems related to reduced in-Delta flow. These actions will decrease fish entrainment at South Delta pumps, which will in turn improve ecosystem quality and water supply reliability.

In this alternative, a portion of the State Water Project and Central Valley Project diversions will be relocated upstream of the confluence of the Sacramento and Feather rivers to provide flow for the canal. The Folsom South Canal also may be incorporated. These diversions will provide high-quality water in that they do not draw from the Delta where water quality is degraded by salt and other elements.

The new canal will operate primarily in the winter and spring to capture flows for groundwater banking and subsequent use. It will be connected to east-side projects and will improve water supplies to east-side San Joaquin Valley water users, facilitate water exchanges with these users, and potentially serve a portion of Sacramento County. With the canal providing water to these regions, they will rely less on local water sources, allowing more water to flow downstream into the Delta. Operation also will reduce reverse flow in the South Delta.

Improvements to ecosystem quality include fish screening at critical and moderate priority locations and moderate pollution source control measures. Moderate habitat improvements along the Sacramento and San Joaquin rivers, in the Delta, and near Suisun Bay will be incorporated with moderate levee improvements. Additional improvements will include moderate demand management and retirement of marginally productive agricultural land that contributes substantially to water quality problems.



ALTERNATIVE H

CHAIN OF LAKES CONVEYANCE

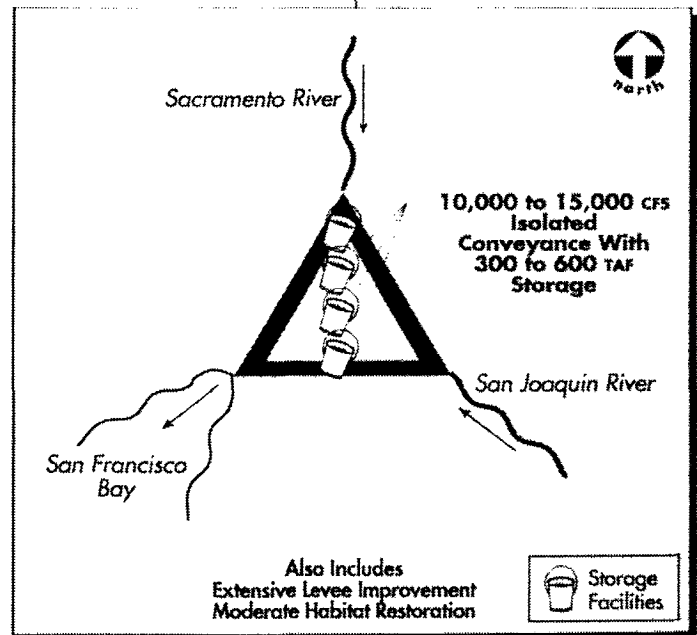
A string of Delta islands will be converted into a "chain of lakes" to serve both storage and conveyance purposes. The lakes will be fed by screened diversions from the Sacramento River and convey water directly to the export pumps. Additional screened diversions will feed the lakes at other points to provide operational flexibility. The lakes will be connected by inverted siphons running under existing channels so that flow between lakes does not interfere with regular channel flow.

This alternative includes a chain of lakes and extensive levee system upgrades incorporating moderate levels of ecosystem restoration. Together, these lake and levee improvements are intended to improve water supply and ecosystem quality, reduce system vulnerability, and prevent reverse flow in the South Delta.

The lakes may be drained and replenished several times each year, and real-time fish monitoring will be conducted so the lakes can be filled at times and from diversion points least likely to impact fish. Stored water will be drawn during periods of fish vulnerability.

Habitat will be restored and levees upgraded at critical and moderate priority sites throughout the Delta. Additionally, habitat will be restored along the Sacramento and San Joaquin rivers, and new habitat developed near Suisun Bay. Extensive pollution control measures will further improve the ecosystem and benefit water quality.

Other actions will include moderate demand management and retirement of agricultural land that contributes substantially to water quality problems.



ALTERNATIVE I

WEST-SIDE CONVEYANCE AND RIVER RESTORATION

Large storage facilities will be built on the west side of the Sacramento Valley, and a new isolated conveyance facility will connect these facilities to South Delta pumps. Elimination of major Sacramento River diversions and restoration of meander belts will significantly improve Sacramento River habitat conditions for fish.

In this alternative, high-quality water from Lake Shasta and the Feather River will be diverted during high flows to the new storage facilities, and operation of Shasta and Oroville reservoirs will be modified to the extent required so that they work in concert with the new facilities.

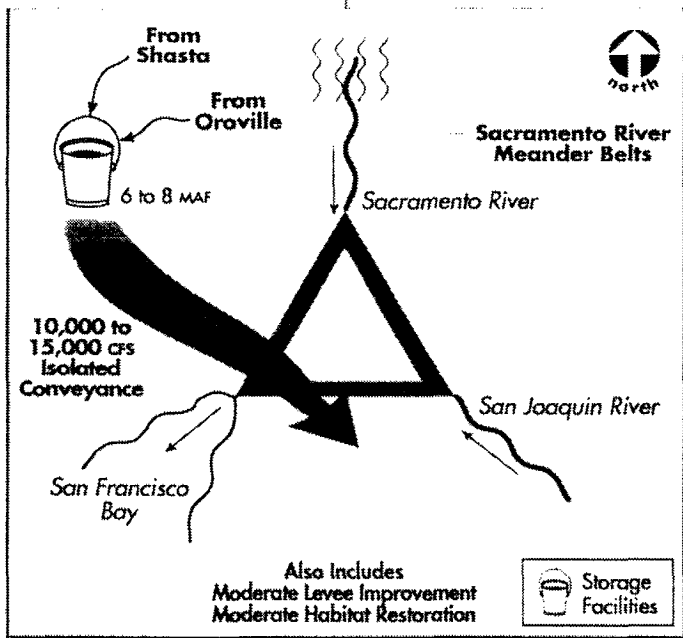
When Sacramento River diversions are eliminated, irrigation districts will receive stored water from the new facility. Turnouts along the new conveyance

system will serve west-side agricultural and groundwater conjunctive use areas. Additional interties could serve smaller aqueducts and canals.

Construction of these facilities will greatly reduce fish entrainment. Extensive restoration of habitat, particularly along meander belts on the upper Sacramento River, will further improve ecosystem quality. Additional improvements to habitat will be carried out in the Delta, Suisun Bay, and along the San Joaquin River. Where feasible, habitat restoration will be combined with moderate levee system improvements.

Other actions will include fish screening at critical and moderate priority sites in the Delta and in upstream tributaries. Water quality objectives will be addressed through measures such as moderate pollution source control, timing of discharges, and retirement of marginally productive agricultural land.

Operation of the new storage and conveyance facilities will improve supply reliability and reduce entrainment of fish at Delta pumps.



ALTERNATIVE J

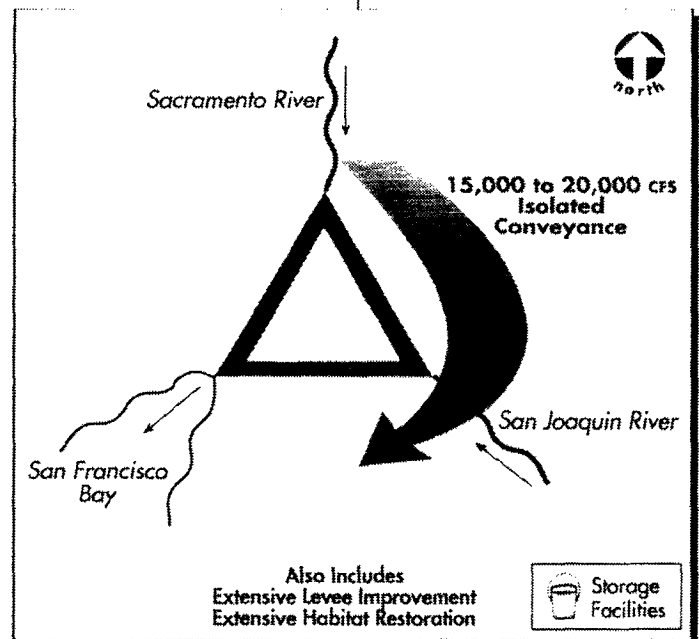
EAST-SIDE CONVEYANCE

A large isolated conveyance facility will be constructed east of the Delta and extensive habitat restoration will be undertaken throughout the Bay-Delta system. The new facility will reduce fish entrainment, improve water quality for export users, and enhance water supply reliability.

In this alternative, export diversions will be relocated to a new screened intake on the Sacramento River. The conveyance facility will transport water from the new diversion to existing pumps in the South Delta and provide water to the Central Valley Project, the State Water Project, and—potentially—to users in the Bay Area and Sacramento and San Joaquin counties. It will include siphons under all

important stream courses to prevent disruption of water quality and maintain aquatic habitat in the stream.

This alternative includes all habitat improvements found in Alternative E, including development of new habitat in the Delta, near Suisun Bay, and along the Sacramento and San Joaquin rivers. Extensive levee and flood control channel improvements will reduce system vulnerability. In addition, moderate amounts of agricultural land contributing substantially to water quality problems will be retired, and extensive pollutant source controls will be implemented. Moderate demand management also will be included.



GLOSSARY

AF Abbreviation for acre feet; the volume of water that would cover one acre to a depth of one foot, or 325,851 gallons of water. On average, could supply 1-2 households with water for a year.

Alternative A collection of actions or action categories assembled to provide a comprehensive solution to problems in the Bay-Delta system.

Action A structure, operating criteria, program, regulation, policy, or restoration activity that is intended to address a problem or resolve a conflict in the Bay-Delta system.

Action Category A set of similar actions. For example, all new or expanded off-stream storage might be placed into a single action category.

Anadromous Fish Fish that spend a part of their life cycle in the sea and return to freshwater streams to spawn.

Best Management Practices (BMP) An urban water conservation measure that the California Urban Water Conservation Council agrees to implement among member agencies.

Central Valley Project (CVP) A federally operated water management and conveyance system that provides water to agricultural, urban, and industrial users in California.

CFS An abbreviation for cubic feet per second.

Channel Islands Natural, unleveed land masses within Delta channels. Typically good sources of habitat.

Conjunctive Use The operation of a groundwater basin in combination with a surface water storage and conveyance system. Water is stored in the ground water basin for later use in place of or to supplement surface supplies. Water is

stored by intentionally recharging the basin during years of above-average water supply.

Conveyance A pipeline, canal, natural channel or other similar facility that transports water from one location to another.

Central Valley Project Improvement Act (CVPIA) This federal legislation, signed into law on October 30, 1992, mandates major changes in the management of the federal Central Valley Project. The CVPIA puts fish and wildlife on an equal footing with agricultural, municipal, industrial, and hydropower users.

Delta Islands Islands in the Sacramento-San Joaquin Delta protected by levees. Delta Islands provide space for numerous functions including agriculture, communities, and important infrastructure such as power plants, transmission lines, pipelines, and roadways.

Demand Management Programs that seek to reduce demand for water through conservation, rate incentives, fallowing of agricultural lands, drought rationing, and other activities.

Diversions The action of taking water out of a river system or changing the flow of water in a system for use in another location.

Drought Conditions A time when rainfall and runoff are much less than average. One method to categorize annual rainfall is as follows, with the last two categories being drought conditions: extremely wet, wet, normal, dry, and critically dry.

Ecosystem A recognizable, relatively homogeneous unit that includes organisms, their environment, and all the interactions among them.

Entrainment The process of drawing fish into diversion pumps along with water, resulting in the loss of such fish.

Endangered Species Act (ESA) Federal legislation that provides protection for species that are in danger of extinction.

Export Water diversion from the Delta used for purposes outside the Delta.

Fish Migration Barriers Physical structures or behavioral barriers that keep fish within their migration route and prevent them from entering waters that are not desirable for them or their migration pattern.

Fish Screens Physical structures placed at water diversion facilities to keep fish from getting pulled into the facility and dying there.

Groundwater Banking Storing water in the ground for use to meet demand during dry years.

In-lieu Groundwater Banking Replaces groundwater used by irrigators with surface water to build up and save underground water supply for use during drought conditions.

Inverted Siphon A pipeline that allows water to pass beneath an obstacle in the flow path. For example, an inverted siphon could be used to allow water in a canal to pass under a Delta channel.

Isolated Conveyance Facility A canal or pipeline that transports water between two different locations while keeping it separate from Delta water.

Land Fallowing/Retirement Allowing previously irrigated agricultural land to temporarily lie idle or purchasing such land and allowing it to remain out of production for a variety of purposes.

MAF An abbreviation for million acre feet.

Mining Drainage Remediation Controlling or treating polluted drainage from abandoned mines.

Meander Belt Protecting and preserving land in the vicinity of a river channel in order to allow the river to meander. Meander belts are a way to allow the development of natural habitat around a river.

Non-native Species Also called introduced species; refers to plants and animals that originate elsewhere and migrate or are brought into a new area, where they may dominate the local species or in some way negatively impact the environment for native species.

Real-Time Monitoring Continuous observation in multiple locations of biological conditions on site in order to adjust water management operations to protect fish species and allow optimal operation of the water supply system.

Riparian The strip of land adjacent to a natural water course such as a river or stream. Often supports vegetation that provides the best fish habitat values when growing large enough to overhang the bank.

Riverine Habitat within or alongside a river or channel.

Setback Levee A constructed embankment to prevent flooding that is positioned some distance from the edge of the river or channel. Setback levees allow wildlife habitat to develop between the levee and the river or stream.

Shallow Water Water with little enough depth to allow for sunlight penetration, plant growth, and the development of small organisms that function as fish food. Serves as spawning areas for Delta smelt.

Smolt A young salmon that has assumed the silvery color of the adult and is ready to migrate to the sea.

Solution Principles Fundamental principles that guide the development and evaluation of Program alternatives. They provide an overall measure of acceptability of the alternatives.

State Water Project (SWP) A state-operated water management and conveyance system that provides water to agricultural, urban, and industrial users in California.

TAF An abbreviation for thousand acre feet.

Take Limit The numbers of fish allowed to be lost or entrained at a water management facility before it must limit or cease operations. The numbers are set for different species by regulations.

Terrestrial Types of species of animal and plant wildlife that live on or grow from the land.

Water Conservation Practices that encourage consumers to reduce the use of water. The extent to which these practices actually create a savings in water depends on the total or basin-wide use of water.

Water Reclamation Practices that capture, treat and reuse water. The waste water is treated to meet health and safety standards depending on its intended use.

Water Transfers Voluntary water transactions conducted under state law and in keeping with federal regulations. The agency most involved is the State Water Resources Control Board (SWRCB).

Watershed An area that drains ultimately to a particular channel or river, usually bounded peripherally by a natural divide of some kind such as a hill, ridge, or mountain.



**CALFED
BAY-DELTA
PROGRAM**

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